PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Captive Broodstock Artificial Propagation

BPA project number: 9801006
Contract renewal date (mm/yyyy): 1/2000 ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Nez Perce Tribe Department of Fisheries Resources Management

Business acronym (if appropriate) NPT

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses
7.4D1, 7.4C.1, 7.4E, 7.3B.2

FWS/NMFS Biological Opinion Number(s) which this project addresses
ESA Section 10 Permit No. 973 and Permit No. 1134

Other planning document references
Captive broodstock programs for Grande Ronde River chinook were identified as a high priority for hatchery intervention in the Proposed Recovery Plan for Snake River Salmon (NMFS 1995). The Wy-Kan-Ush-Mi Wa-Kish-Wit plan (1995) also calls for the immediate initiation of a captive broodstock program in the Grande Ronde subbasin (Vol. II, pg116).

Short description
Implement the captive broodstock project through the collection of juvenile salmon from the wild and maintaining them in captivity. The founding generation is spawned at maturity and the resulting F1 generation is released back to the parental stream.

Target species

Spring chinook salmon

Section 2. Sorting and evaluation

Subbasin
Grande Ronde River

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☒ Anadromous fish ☐ Resident fish ☐ Wildlife	☒ Multi-year (milestone-based evaluation) ☐ Watershed project evaluation	☐ Watershed councils/model watersheds ☐ Information dissemination ☐ Operation & maintenance ☐ New construction ☒ Research & monitoring ☐ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20556	Grande Ronde Endemic Spring Chinook Supplementation Program
9801001	Grande Ronde Captive Broodstock - ODFW
9801007	Captive Broodstock Artifical Propagation - NPT

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9801001	Grande Ronde Basin Spring Chinook Captive Broodstock Program	Depends on project 9801001 to rear smolt-to-adult at Bonneville Hatchery (freshwater strategy).
9606700	Manchester Captive Brood O&M	Depends on project 9606700 to rear smolt-to-adult at Manchester Marine Laboratory (saltwater strategy).
9305600	Assessment of Captive Broodstock Technology	Depends on project 9305600 for NMFS assessment of captive broodstock technology.
9703800	Listed Stock Chinook Salmon Gamete Preservation	Depends on project 9703800 for the use of cryopreserved semen in

		spawning protocols in order to enhance genetic diversity of captive brood populations.
9800702	Grand Ronde Supplementation Project O&M/M&E	Is integrated with the activities of project 9800702
8805301	Northeast Oregon Hatcheries	Will be integrated with the activities of project 8805301
	Lower Snake River Compensation Plan Hatchery Program	Depends on LSRCP for parr-to-smolt rearing at Lookingglass Hatchery

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1995	Cooperatively developed the Section 10 Permit for the collection of chinook parr from the Lostine, Catherine Creek, and upper Grande Ronde Rivers	N/A
1996	Participated in CONSPOT and captive broodstock management plan meetings	N/A
1998	Acquired funding for full NPT participation in the captive brood program	N/A
1998	Collected 501 wild parr from the Lostine River	Yes, Obj 2a
1998	Collected biological data from juvenile captives at LGH	Yes, Obj 2d
1998	Implanted VI tags and collected biological data from maturing captives at BOH and MML	Yes, Obj 3a,b
1998	Spawned 317 captive brood fish (122 females)	Yes, Obj 3e
1998	Aquired baseline data on remnant population of wild chinook in the Lostine River	Yes, Obj 4a-f
1998	Summarizing and evaluating data collected from captive and wild chinook populations	N/A

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Coordinate the Captive Broodstock Artificial Propagation project with state, tribal and federal management agencies in the Snake River basin.	a	Coordinate all aspects of the chinook captive broodstock project interms of planning, implementation and monitoring and evaluation with ODFW, CTUIR and NMFS.
		b	Attend TOT meetings to represent the interest of and to provide information for the Nez Perce Tribe.
		c	Coordinate and facilitate the use of collected data with ODFW.
		d	Coordinate and assist ODFW in computer database management of all monitoring information collected on chinook captive broodstock at LFH, BOH,and MML.
2	Monitor and evaluate captive brood chinook parr at Lookingglass Fish Hatchery (LFH) with ODFW and CTUIR.	a	Collect chinook parr with ODFW from the Lostine River during July and August. Collect biological information of length, weight and general fish condition from a sample of fish at collection.
		b	Assist in loading and transport of juvenile chinook to LFH and determine the mortality rate of juvenile chinook collected and transported to LFH and collect information on observed mortalities.
		c	Assist ODFW in PIT tagging all captive brood juvenile chinook at LFH.
		d	Collect biological information of fork length, weight and general fish condition from a sample of fish at LFH at regular periodic intervals and assess growth profiles and condition factors of chinook captive broodstock at LFH.
		e	Collect caudal tissue from juvenile chinook for genetic analysis.
		f	Assist ODFW in salinity tolerance tests to determine when captive brood fish are ready for transport to the Manchester Marine Laboratory

			for saltwater rearing.
		g	Determine survival rate of juvenile fish in LFH from collection to transport off-station to the Manchester Marine Laboratory and Bonneville Hatchery.
		h	Assist in transport of fish to Bonneville Hatchery and to the Manchester Marine Laboratory and determine the mortality rate of fish transported to Bonneville Hatchery and Manchester Marine Laboratory and collect information on observed mortalities.
3	Monitor and evaluate chinook captive broodstock reared at Bonneville Hatchery and at the Manchester Marine Laboratory with ODFW and CTUIR.	a	Tag fish with visual implant (VI) tags and measure fork length and weight of a sample of the fish.
		b	Measure fork length and weight of a sample of fish when any rearing parameters change and assess growth profiles of chinook captive broodstock at Manchester Marine Laboratory and at Bonneville Hatchery.
		c	Determine survival rates of Lostine River chinook captive broodstock under saltwater rearing (MML) and freshwater (BOH) rearing strategies.
		d	Determine maturation rates, ages II through V, of Lostine River chinook captive broodstock under saltwater rearing (MML) and freshwater (BOH) rearing strategies.
		e	Assist ODFW in spawning freshwater reared and saltwater reared chinook captive broodstock adults at BOH.
		f	Collect fork length and weight information on all spawned fish and compare the age and size at maturity of adults that are reared in freshwater versus saltwater.
		g	Coordinate the cryopreservation activities associated with captive

			broodstock spawning.
		h	Compare the fecundity of females reared in freshwater versus saltwater rearing strategies.
		i	Compare fertilization rates for all spawned females in freshwater and saltwater rearing strategies.
		j	Compare the spawning time for freshwater and saltwater reared captive adults.
4	Monitor the abundance and timing of migration of adult chinook salmon into the Lostine River.	a	Assist project 9800702 as necessary with adult escapement data collection. 9800702 responsible for adult escapement monitoring and data analysis.
5	Monitor the F1generation from the 1998 spawning episode	a	Calculate and compare green-egg to eyed-egg survival between treatment groups.
		b	Measure and compare growth profiles between treatment groups.
		c	Pit tag a subsample of F1 generation parr at LGH.
		d	Estimate survival of released F1 generation smolts to Lower Granite, Little Goose, Lower Monumental and McNary Dams using SURPH.1 model.
6	Annual report preparation.	a	Prepare and provide annual reports cooperatively with ODFW and CTUIR summarizing all activities associated with the captive broodstock project.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measurable biological objective(s)	Milestone	FY2000 Cost %
1	1/2000	12/2000			10.00%
2	8/2000	10/2000	Collection of biological data from juvenile captives		15.00%
3	1/2000	12/2000	Collection of biological data from maturing captives	captive broodstock spawning	25.00%
4	5/2000	10/2000	Collection of biological	release of F1	15.00%

			data from wild remnant population and F1 generation released to stream	smolts to parental stream	
5	11/2000	12/2000	Survival Estimates (in hatchery and in river)		10.00%
6	11/2000	4/2001	Annual Report Prep.	Annual Report to BPA	25.00%
				Total	100.00%

Schedule constraints
Annual abundance of juvenile chinook salmon in the Grand Ronde subbasin, unsynchronized adult salmon maturation schedules, hatchery catastrophe, management decision to utilize a conventional hatchery program exclusively, and funding constraints.

Completion date
Anticipated to continue through at least 2015.

Section 5. Budget

FY99 project budget (BPA obligated): $67,000

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	0.5 Project Leader, 0.5 Biologist, Administrative support	%36	52,178
Fringe benefits	27% regular employees	%9	13,028
Supplies, materials, non-expendable property	Field supplies	%2	2,500
Operations & maintenance	Offices services, rent , training	%8	11,337
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	0
NEPA costs		%0	0
Construction-related support		%0	0
PIT tags	# of tags: 500	%1	1,450
Travel	Bonneville and Manchester Hatcheries	%10	14,188
Indirect costs	@22.9%	%15	21,350
Subcontractor	Genetic Analysis	%21	30,000
Other		%0	0

TOTAL BPA FY2000 BUDGET REQUEST	$146,031

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
		%0	
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			$146,031

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$155,000	$162,000	$165,000	$170,000

Section 6. References

Watershed?	Reference
☐	Anders, P.J. 1998. Conservation Aquaculture and Endangered Species: Can Objective Science Prevail over Risk Anxiety?. Fisheries, 23(11):28.
☐	Bailey, J., and H.L. Kincaid. 1989. Pages 5-10 in Atlantic Salmon Broodstock Management and Breeding Handbook. Biological Report 89(12) U.S. Fish & Wildlife Service, U.S. Dept. of the Interior.
☐	DeBlieu, J. 1993. Meant to be wild: the struggle to save endangered species through captive breeding. Fulcrum Publishing, Golden, Colorado, 302 p.
☐	DeHart, D. 1996. Application for a permit for scientific purposes and to enhance the propagation or survival of endangered Grande Ronde River basin spring chinook salmon, Oncorhynchus tshawytscha, under the Endangered Species Act. Portland, OR.
☐	Flagg, T.A. 1993. Redfish Lake sockeye salmon captive broodstock rearing and research, 1993. Report to Bonneville Power Administration, Contract DE-AI79-92BP41841, 99 p.
☐	Flagg, T.A. and C.V.W. Mahnaken. 1995. An Assessment of the Status of Captive Broodstock Technology for Pacific Salmon. Report to Bonneville Power Administration, Contract DE-AI79-93BP55064, 285 p.
☐	Gipps, J.H.W. (editor). 1991. Beyond captive breeding: reintroducing endangered species through captive breeding. Zool. Soc. London Symp. 62, 284 p.
☐	Johnson, J.E., and B.L. Jensen. 1991. Hatcheries for endangered freshwater fish. In W.L. Minckley and J.E. Deacon (editors), Battle against extinction, p. 199-217. Univ. Arizona Pres, Tucson.
☐	NMFS. 1995. Proposed Recovery Plan for Snake River Salmon. National

	Marine Fisheries Service, Portland, OR.
☐	NPPC. 1994. Columbia River Basin Fish and Wildlife Program. Northwest Power Planning Council. Portland, OR.
☐	Olney, P.J.S., G.M. Mace, and A.T.C. Feistner. 1994. Creative conservation: interactive management of wild and captive animals. Chapman and Hall, London, England. 571 p.
☐	Smith, C.J. and P. Wampler. 1995. Dungeness River chinook salmon rebuilding project. Northwest Fishery Bulletin, Progress Report Series No. 3, Washington Department of Fish and Wildlife, Olympia.
☐	Smith, S.G., J.R. Skalski, J.W. Schlechte, A. Hoffmann, and V. Cassen. 1994. Statistical survival analysis of fish and wildlife tagging studies. Report to Bonneville Power Administration, Portland, OR. Contract DE-B179-90BP02341, Project 89-107, 268p.
☐	Wy-Kan-Ush-Mi Wa-Kush-Wit, Spirit of the Salmon. 1995. The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakima Tribes. Columbia River Intertribal Fish Commission, Portland, OR.

PART II - NARRATIVE

Section 7. Abstract

A spring chinook captive broodstock program was initiated in 1995 in the Grande Ronde subbasin. Wild juvenile chinook salmon are collected from the Lostine River, Catherine Creek and upper Grande Ronde River and maintained in captivity throughout their life to produce offspring. Fish are reared at Lookingglass Fish Hatchery until the smolt stage and then are transferred to facilities at Bonneville Hatchery and to the Manchester Marine Laboratory. This allows the ability to evaluate freshwater and saltwater captive broodstock rearing strategies. Chinook salmon parr were also collected in 1996 from the Lostine River and Catherine Creek. In 1997 and 1998 juvenile chinook were collected from all three streams. The program was initiated in an attempt to maximize the species reproductive potential and to preserve the population through use of acclimated smolt releases to return a threshold number of spawning chinook salmon adults to the three rivers. The program is intended to complement the conventional production that is also occurring in the Grande Ronde subbasin. The Oregon Department of Fish and Wildlife and the Nez Perce Tribe work cooperatively as sponsors of the captive broodstock program.

Project goals are to: 1) prevent extirpation of the native chinook salmon population, 2) preserve and enhance the chinook salmon population through implementation and use of the captive broodstock program, 3) maintain genetic diversity in the artificially propagated captive broodstock chinook population, 4) maintain genetic diversity and life history traits in the natural population of salmon in the Grande Ronde subbasin.

Section 8. Project description

a. Technical and/or scientific background

The Grande Ronde River subbasin once supported large numbers of spring chinook salmon. Recent historical returns of over 10,000 adult salmon have been estimated for the subbasin (DeHart 1996). Current population levels, however, are severely reduced. In 1992 Snake River spring/summer chinook were listed as a threatened species under the Endangered Species Act (ESA). Declines are still substantial and continuous. For example, the Lostine River is considered one of the most productive spawning and rearing streams in the Grand Ronde system. In 1957, 893 spring chinook redds were counted in the Lostine. By 1998, only 35 chinook redds were observed. Clearly, the precipitous decline of these populations is indicative of a species trending toward extirpation. Salmon managers in the subbasin consider the current condition of these populations to constitute an emergency situation.

Captive propagation of animals for endangered species restoration is a widely accepted method (DeBlieu 1993; Gipps 1991; Olney et al. 1994). Almost 200 animal species are currently enhanced through captive breeding techniques (Flagg and McAuley 1994). For ESA listed fish populations, captive broodstock programs are also emerging as important components in recovery efforts. Several endangered populations of Atlantic salmon, winter and spring chinook, coho, and sockeye salmon are now maintained by programs utilizing captive broodstock technology (Anders 1998; Bailey and Kincaid 1989; Flagg and Mahnaken 1995; Johnson and Jensen 1991). This technology holds promise as a means of accelerating recovery by maximizing the species reproductive potential. In light of the above, a captive broodstock program was initiated in 1995 in the Grande Ronde subbasin by the Nez Perce Tribe in cooperation with co-managers.

b. Rationale and significance to Regional Programs

The Captive Broodstock Artificial Propagation chinook project in the Grande Ronde subbasin is a high priority project recognized by state, federal and Tribal representatives through the Columbia Basin Fish and Wildlife Authority (CBFWA). This project has been coordinated with the Oregon Department of Fish and Wildlife (ODFW), the U.S. Fish and Wildlife Service, and National Marine Fisheries Service (NMFS). Project coordination with NMFS has resulted in sharing of NMFS facilities at the Manchester Marine Laboratory and in ODFW procuring a Section 10 permit to conduct chinook salmon captive broodstock enhancement activities in the Grande Ronde subbasin. The NMFS Recovery Plan for Snake River Salmon (1995), under the Endangered Species Act, acknowledges the use of captive broodstock programs to prevent population extinction and to supplement and enhance natural chinook populations.

Northwest Power Planning Council (NPPC) program measure 7.4D addresses captive brood stock studies within the Columbia River Basin Fish and Wildlife program (1994). It acknowledges that “captive brood stock programs have the potential to rapidly increase adult fish numbers, while retaining genetic diversity of severely depleted wild or naturally spawning stocks of salmon≅. The NPPC program measure also states that implementation of captive brood stock programs may be the most effective means of accelerating recovery of severely depleted stocks. NPPC program measure 7.4D.2 directs that the program fund captive brood stock demonstration projects identified under the coordinated habitat and production process. It also advises that adequate evaluation be conducted to understand the fitness of captive brood progeny for supplementation, evaluation of fish husbandry and fish health techniques and development of culture systems that minimize loss of fish. A similar NPPC Measure (7.3.B2) directs the implementation of high priority supplementation projects which should include monitoring and evaluation.

c. Relationships to other projects

The Nez Perce Tribe has worked cooperatively with the ODFW, USFWS in the planning and development of a Section 10 permit for collection of captive broodstock juvenile chinook salmon from the Lostine River in 1995. We have further participated in CONSPOT meetings and a captive broodstock management plan in 1996 which outlines the program approach. Cooperative efforts with ODFW and NMFS are required for fish reared at Lookingglass Fish Hatchery until the smolt stage and transferred to facilities at Bonneville Hatchery and to the Manchester Marine Laboratory.

Artificial Production projects identified in the FWP that are or will be associated with this proposal are: 9800702 Grande Ronde Supplementation - O&M/M&E, 9703800 - Listed Stock Gamete Preservation (NPT), 8805301 - NEOH Master Plan (NPT), 8805302 - Upper Grande Ronde River Co-Management (CTUIR), and 8805305 –NEOH Master Plan and Facilities (ODFW).

Monitoring and Evaluation projects identified in the FWP that will complement this proposal are: 9800702 - Grand Ronde Supplementation M&E, 8712700 - Smolt Monitoring by Non-Federal Entities and 9202604 – Spring Chinook Salmon Early Life History (ODFW),

Habitat improvement projects identified in the FWP that will enhance survival of out planted fish produced under this proposal are: 5507000 - Grande Ronde Subbasin Watershed Restoration (CTUIR), 9402700 – Grande Ronde Model Watershed Habitat Projects (GRMWP), 9702500 - Wallowa County/NPT Salmon Habitat Recovery (NPT), and 8402500 - Grande Ronde Habitat Enhancement (ODFW).

Other programs that directly effect the success of this project include the Lower Snake River Compensation Program which currently provides the facilities, equipment, and personnel to facilitate production, evaluations, and fish health monitoring.

d. Project history (for ongoing projects)

Chinook captive broodstock program activities were initiated in 1995 with the collection of juvenile chinook salmon from the Lostine River, Catherine Creek and upper Grande Ronde River. The Nez Perce Tribe worked cooperatively with the ODFW, USFWS in the planning and development of a Section 10 permit for collection of captive broodstock juvenile chinook salmon from the Lostine River. Furthermore, we participated in CONSPOT meetings and a captive broodstock management plan in 1996 which outlines the program approach.

Fish were reared at Lookingglass Fish Hatchery until the smolt stage and then transferred to temporary facilities at Bonneville Hatchery and to the Manchester Marine Laboratory. This allowed the ability to evaluate freshwater and saltwater captive broodstock rearing strategies. Chinook salmon parr were also collected in 1996 from the Lostine River and Catherine Creek and in 1997 and 1998 from all three streams. 1998 represented the first year in which female captive brood fish matured and became ripe. One hundred and twenty two females were spawned resulting in an estimated 219,600 embryos. Semen from 108 captive brood males was cryopreserved and is now available for future use.

The Nez Perce Tribe was funded for monitoring and evaluation in 1997 by the USFWS through the LSRCP. Bonneville Power Authority directly funded the Tribe for $97,211 in 1998 which allowed for the full participation by NPT. In 1999 the Tribe was funded a reduced amount of $67,000 which affected meeting full project responsibilities. Participation by the Tribe in 2000 and beyond will require increased funds for continued cooperative planning, management coordination, implementation and monitoring and evaluation of the Lostine River captive broodstock program.

Management implications of this project directly relate to the preservation of listed chinook salmon populations in the Grande Ronde subbasin. Given the uncertainty of captive broodstock technology, the monitoring and evaluation component of this project allows for an adaptive approach. If successful it will provide time to address factors that limit population persistence and recovery of Pacific salmon in the Snake River basin.

e. Proposal objectives

The overall **GOAL** of the project is to prevent extirpation of the native chinook salmon of the Grande Ronde subbasin and to maintain genetic diversity in the

captive broodstock along with the life history and genetic uniqueness of the enhanced native population.

OBJECTIVE 1. Coordinate the Captive Broodstock Artificial Propagation project with state and federal management agencies in the Snake River Basin.

OBJECTIVE 2. Monitor and evaluate chinook salmon parr with ODFW. *Measurable.*

Subobjective 2.1. Monitor and evaluate chinook parr at Lookingglass Fish Hatchery (LFH) with ODFW. *Measurable.*

Subobjective 2.2. Monitor and evaluate chinook captive broodstock reared at Bonneville Hatchery and at the Manchester Marine Laboratory with ODFW. *Measurable.*

Null hypothesis 1: Mean length, weight, and condition factor are not significantly different among fish reared under different strategies.
Null hypothesis 2: Smolt-to-adult survival are not significantly different among fish reared under different strategies.
Null hypothesis 3: Fecundity and fertility are not significantly different among fish reared under different strategies.

OBJECTIVE 3. Monitor the abundance and timing of migration of adult chinook salmon into the Lostine River. *Measurable*.

Null hypothesis 1: Implementation of captive broodstock technology has not increased adult escapement of spring chinook salmon in the Lostine River.
Null hypothesis 2: Implementation of captive broodstock technology has altered the migration timing of spring chinook salmon in the Lostine River.

OBJECTIVE 4. Monitor and evaluate the F1 generation from the 1998 captive brood spawn.

Null hypothesis 1: Green-egg to eyed egg survival is not significantly different among groups from adults of differing rearing strategies.
Null hypothesis 2: Smolt-to-adult survival is significantly different than that of naturally produced fish.
Null hypothesis 3: Implementation of captive broodstock technology has altered the life history and genetic characteristics of spring chinook salmon in the Lostine River

OBJECTIVE 5. Annual Report Preparation.

f. Methods

OBJECTIVE 1. Coordinate the Captive Broodstock Artificial Propagation project with state, tribal and federal management agencies in the Snake River basin.

Approach:
The Nez Perce Tribe participated in the Conservation Planning Oversight Team (CONSPOT) and Integrated Team (IT) planning process with the Oregon Department of Fish and Wildlife and the U.S. Fish and Wildlife Service in the development of the Lostine River captive broodstock plan and Section 10 permit application under the Endangered Species Act (ESA). As a salmon manager, the Tribe is interested in coordinating with ODFW and CTUIR in the successful development and monitoring of the experimental captive broodstock program. To that end, the Nez Perce Tribe participates in the Technical Oversight Team (TOT) with members from ODFW, CTUIR, and NMFS. The Nez PerceTribe believes that close coordination of this captive broodstock project should lead us to an understanding of its effectiveness in the preservation and recovery of threatened and endangered species.

- Coordinate all aspects of the chinook captive broodstock project interms of planning, implementation and monitoring and evaluation with ODFW, CTUIR and NMFS.
- Attend TOT meetings to represent the interest of and to provide information for the Nez Perce Tribe.
- Coordinate and facilitate the use of collected data with co-managers.
- Assist in computer database management of all monitoring information collected on chinook captive broodstock at LFH, MML,and BOH.

OBJECTIVE 2. Monitor and evaluate captive chinook salmon parr with ODFW and CTUIR.

Subobjective 2.1. Monitor and evaluate captive chinook salmon parr at Lookingglass Fish Hatchery (LFH) with ODFW and CTUIR.

Approach:
The captive broodstock management plan, which the Nez Perce Tribe assisted in development of, contains proposed monitoring and evaluation (M&E) of the chinook captive broodstock program throughout all phases of its implementation. The Nez Perce Tribe did not received sufficient funding to fully participate in the captive broodstock program until 1998. Since the initiation of the captive broodstock program in 1995 there have been adjustments to the plan and the development of the Technical Oversight Team (TOT) that meets on a regular basis to discuss program effectiveness, problems encountered and to discuss necessary management changes. The following tasks will be conducted to evaluate natural chinook which are reared at LFH until smolt size and before transport to the Manchester Marine Laboratory (MML) and Bonneville Hatchery (BOH) for rearing to adult size. Tribal evaluation staff will coordinate closely with ODFW in the ongoing evaluation of natural chinook which are reared at LFH.

- Collect chinook parr from the Lostine River during July and August. Collect biological information of length, weight and general fish condition from a sample of fish at collection.
- Assist in loading and transport of juvenile chinook to LFH and determine the mortality rate of juvenile chinook collected and transported to LFH and collect information on observed mortalities.
- Assist in PIT tagging all captive brood juvenile chinook in LFH.
- Collect biological information of fork length, weight and general fish condition from a sample of fish at LFH at regular periodic intervals and assess growth profiles and condition factors of chinook captive broodstock at LFH.
- Collect caudal tissue from juvenile chinook for genetic analysis.
- Assist in salinity tolerance tests to determine when captive brood fish are ready for transport to the MML for saltwater rearing.
- Determine survival rate of juvenile fish in LFH from collection to transport off-station to the MML and BOH.
- Assist in transport of fish to BOH and to the MML and determine the mortality rate of fish transported to BOH and MML and collect information on observed mortalities.

Subobjective 2.2. Monitor and evaluate chinook salmon captive broodstock reared at Bonneville Hatchery and at the Manchester Marine Laboratory.

Approach:
Sometime before or during the smoltification process, chinook at LFH are transported to either the BOH (freshwater rearing) or to the MML (saltwater rearing). Evaluation of captive brood post-smolts would occur for the groups reared in freshwater and saltwater rearing strategies until the fish matured at age II (precocial males), III, IV or V. Evaluation of fish during post-smolt growth periods would be minimized to avoid disturbances to the captive brood fish. Assistance will be provided and closely coordinated with ODFW and CTUIR for visual implant (VI) tagging, analysis of mortalities, spawning of fish, collection of information from spawned adults and collection of cryopreservation samples.

- Tag fish with VI tags and measure fork length and weight of a sample of the fish.
- Measure fork length and weight of a sample of fish when any rearing parameters change.
- Assess growth profiles of chinook captive broodstock at Manchester Marine Laboratory and at Bonneville Hatchery.
- Determine survival rates of chinook captive broodstock under saltwater rearing (MML) and freshwater (BOH) rearing strategies.
- Determine maturation rates, ages II through V, of chinook captive broodstock under saltwater rearing (MML) and freshwater (BOH) rearing strategies.
- Assist in spawning freshwater reared and saltwater reared chinook captive broodstock adults at BOH.

- Coordinate the cryopreservation activities associated with captive broodstock spawning.
- Collect fork length and weight information on all spawned fish.
- Compare the age and size at maturity of adults that are reared in freshwater versus saltwater.
- Determine and compare the fecundity of females reared in freshwater versus saltwater rearing strategies.
- Determine and compare fertilization rates for all spawned females in freshwater reared and saltwater rearing strategies.
- Determine and compare the timing of spawning for freshwater reared and saltwater reared captive adults.

OBJECTIVE 3. Monitor the abundance and timing of migration of adult chinook salmon into the Lostine River.

Approach:
An adult chinook salmon fish weir and trap are planned for operation in the Lostine River in 1998 as part of a separate project to trap and spawn adults and develop a conventional hatchery smolt production program. Main responsibility for adult escapement measurement is with Project No. 9800702. Assistance will be provided in installing, operating and removing the trap as necessary. Close coordination will occur to ensure quality data collection, and sharing of information to address elements of adult chinook salmon captive brood returns. Information collected from this facility will assist in developing baseline information on the abundance and timing of migration of adult salmon into the Lostine River for comparison with progeny of captive brood parents. Adults from the F1 generation are expected to return beginning in the year 2002. Information on adult size and age composition of the run will be obtained from salmon carcasses collected on the spawning grounds in a cooperative effort with ODFW.

OBJECTIVE 4. Monitor and evaluate the F1 generation offspring.

Approach:
Monitoring of the captive brood production rearing at Lookingglass Hatchery allows for a measure of comparison among treatment groups and across years. Therefore, data collected during the rearing process assists in the proper evaluation of the captive brood product used in supplementation.
- Calculate and compare green-egg to eyed-egg survival between treatment groups.
- Measure and compare growth profiles between treatment groups.
- Assist ODFW in PIT tagging a subsample of F1 generation parr at LGH.
- Estimate survival of released F1 generation smolts to Lower Granite, Little Goose, Lower Monumental and McNary Dams using SURPH.1 model.

OBJECTIVE 5. Annual Report Preparation.

- Prepare and provide annual reports cooperatively with ODFW and CTUIR summarizing all activities associated with the Lostine River chinook salmon captive broodstock project.

Critical Assumption The assumption of this project is that limiting factors affecting survival of Snake River chinook salmon will be addressed in the near future. Our efforts will be negated if improvements in smolt-to-adult survival are not forthcoming.

Expected Results This program plans to rear and release 150,000 acclimated smolts in an attempt to return at least 150 spawning adults to the Lostine River.

Justification of Sample Size Data from similar programs suggest a 50% survival rate from collection to spawn for parr collected from the wild (Smith and Wampler 1995). Based on predicted fecundities, egg viability, and eyed egg to smolt survival of the F1 generation, 500 wild parr will be required each year to achieve the goal of releasing 150,000 smolts.

Sample size requirements for determining survival to Lower Granite and McNary dams are estimated using the SURPH.1 SAMPLE_SIZE program (Smith et al. 1994). Using observed survival and detection probability rates from recent hatchery releases within the Snake River Basin, estimated minimum release groups of 800 (Lower Granite Dam) to 7500 (McNary Dam) will be required. Sample sizes to obtain juvenile life history (timing and distribution) data are based on obtaining 50 individual observations at Lower Granite Dam.

Potential Risks We acknowledge that captive broodstock technology is unproven and that uncertainty exists in terms of its application to preserve threatened chinook salmon populations. Since this program is experimental in nature it will attempt to answer many of these uncertainties as the project progresses. Uncertainties include: maturation of adults at the correct time and age; quality of adult gametes; potential domestication effects; genetic effect to both the artificially propagated population and the wild population once captive brood adults return to spawn; and fitness of the captive brood adults.

g. Facilities and equipment

The Nez Perce Tribe utilizes administrative office space at the Enterprise Field Office (Oregon). Two micro computers are dedicated in part to the project's data needs. The project leases a GSA vehicle suitable for project activities. A fenced compound is available for parking of vehicles and storage of equipment. A compound microscope will be purchased for semen motility tests during cryopreservation activities associated with the captive broodstock program.

h. Budget

The Nez Perce Tribe seeks funding for cooperative planning, management coordination, implementation and monitoring and evaluation of the Captive Broodstock Artificial Propagation program. The FY 2000 budget request will allow for the continued participation by the Tribe. Personnel line item costs cover, in part, the salaries and wages of a project leader (0.5 FTE), fisheries biologist (0.5FTE), program leader (0.1FTE), and research coordinator (0.05 FTE) as well as administrative support. Office services are included within the operations and maintenance line item. Frequent travel to Bonneville Hatchery in Portland and to the Manchester Marine Laboratory in Seattle is required for full participation in the program. Monthly attendance at the Technical Oversight Team (TOT) meetings also requires travel. Money ($30,000) to cover genetic analysis of the founding broodstock used in the captive brood program is a new line item in the FY 2000 budget.

Section 9. Key personnel

Project personnel include: James R. Harbeck - Project Leader (0.5 FTE) and R. Glenn Szerlong - Fisheries Biologist (0.5 FTE). Paul Kucera, Director of Biological Services (0.1 FTE), and Jay Hesse, Fisheries Research Coordinator (0.05 FTE), will provide project direction, administrative assistance and agency coordination.

James R. Harbeck is the Captive Broodstock Artificial Propagation Project Leader. Mr. Harbeck has 3 years of professional fisheries experience. He responsible for project implementation for the captive broodstock program and the Lostine River monitoring and evaluation component of the Grande Ronde Basin Supplementation project. Specific duties include coordinating captive brood activities with ODFW, the collection and analysis of data associated with the program, representing the Nez Perce Tribe in meetings with co-managers, personnel supervision, and proposal development.

EDUCATION:	Bachelor of Arts, 1994 Major: Aquatic Biology	Grand Valley State University
	Masters of Science, 1998 Major: Fisheries	Michigan State University

PROFESSIONAL EXPERIENCE:

- Fisheries Biologist, Nez Perce Tribe – 7/98 to Present
  Captive Broodstock Project Leader
  Lostine River Monitoring and Evaluation Project Leader
- Research Assistant, MSU Department of Fisheries and Wildlife –- 1995 -1998
  Primary investigator for a steelhead trout evaluation study
  Estimated the wild and hatchery composition and determined life history characteristics
- Fisheries Creel Clerk, MDNR Fisheries Division – 1994-1995

Collected biological and sociological data from commercial and recreational catch
Evaluated instream habitat structures

- Fisheries Aide, District 9, MDNR Fisheries Division – 1993-1995
  Conducted lake and stream assessments and surveys
  Assisted in stream rehabilitation projects
- Environmental Consultant, Applied Ecology Group – 1993
  Collected and identified aquatic invertebrates
  Conducted literature searches for research projects

R. Glenn Szerlong is the Fisheries Biologist assisting on the Captive Brood Program. Mr. Szerlong has four years of fisheries research experience in the Columbia River Basin. He has been involved in fish culture, adult escapement monitoring, scale pattern analysis, age determination, radio tracking, and juvenile emigration of natural and hatchery fish. This position fill 0.5 FTE.

Education:	Bachelor of Science, 1996 Major : Fisheries Biology	Colorado State University

Jay Hesse is the Research Coordinator for the Captive Broodstock Artificial Propagation project.Mr. Hesse has five years professional experience as a Fisheries Research Biologist and as the Research Coordinator. He is responsible for the technical direction and supervision of fisheries research division projects, research coordination, and research representation at state and federal meetings. This position fills 0.05 FTE.

Education:	Bachelor of Science, 1992 Major: Fisheries and Wildlife	Michigan State University
	Master of Science, 1994 Major: Fisheries	Michigan State University

Paul Kucera is the program leader for the Captive Broodstock Artificial Propagation project. Mr. Kucera has 23 years professional experience as a Fisheries Biologist in research, management and administration and is a Certified Fisheries Scientist through AFS. He has authored or co-authored seven peer-reviewed fisheries journal publications and over 40 project reports. Responsible for technical program direction and administration of the Fisheries Research Division. This position fills 0.1 FTE.

Section 10. Information/technology transfer

Technical information will be distributed through quarterly and annual reports to Bonneville Power Administration. Cooperative annual reports with ODFW will be prepared which summarize all activities associated with the chinook salmon captive broodstock project. Project presentations are provided as requested by BPA. Presentations to state chapter AFS meetings are made as time allows. Project cooperators meet regularly to exchange information and discuss project concerns.

Congratulations!